

Inshore and Offshore Special Area of Conservation (SAC): North Channel

SAC Selection Assessment Document



January 2017

Further information

This document is available as a pdf file on JNCC's website for download if required (www.jncc.gov.uk).

Please return comments or queries to:

Marine Species Advice Team
Joint Nature Conservation Committee
Inverdee House
Aberdeen
AB11 9QA

Email: marinemammals@jncc.gov.uk

Tel: +44 (0)1733 562626

Recommended citation: DAERA and JNCC (2017) SAC Selection Assessment: North Channel. January, 2017. Joint Nature Conservation Committee, UK. Available from: <http://jncc.defra.gov.uk/page-7242>

1. Introduction

This document provides detailed information about the North Channel site proposed for designation for the Annex II species harbour porpoise (*Phocoena phocoena*) and evaluates this interest feature according to the Habitats Directive¹ selection criteria and guiding principles. This is a single feature site, proposed for designation solely for the purpose of aiding the management of harbour porpoise populations throughout UK waters, in accordance with EU legislation. The site includes parts of both Northern Ireland territorial waters (out to 12 nautical miles from the baseline) and offshore waters (from 12 nautical miles from the coast out to 200 nautical miles or to the UK Continental Shelf limit), and is therefore a joint responsibility of the Department of Agriculture, Environment and Rural Affairs in Northern Ireland (DAERA) and the Joint Nature Conservation Committee (JNCC).

The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 (as amended)² transpose the Habitats Directive into law on land and in territorial waters of Northern Ireland. The Offshore Marine Conservation (Natural Habitats &c.) Regulations 2007³ (as amended in 2010) transpose the Habitats Directive into law for UK offshore waters.

The advice contained in the present document is produced to enable the Secretary of State and the Northern Ireland Minister to decide whether to submit the North Channel site to the European Commission as a site eligible for designation as a Special Area of Conservation (SAC), in accordance with Regulation 10 of the Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 (as amended), and Regulation 7 of the Offshore Marine Conservation (Natural Habitats &c) Regulation 2007 (as amended). JNCC and DAERA officials have been asked by Defra and the DAERA Minister to provide this advice.

The Habitats Directive aims to conserve biodiversity by maintaining or restoring Annex I habitats and Annex II species to a favourable conservation status. Member States are required to contribute to a coherent European ecological network of protected sites through designation of SACs for natural habitats and wild species listed on the Annexes of the Directive. Sites eligible for designation as marine SACs are selected on the basis of the criteria set out in Annex III (Stage 1) of the Habitats Directive and relevant scientific information. Sites are considered only if they host a Habitats Directive Annex I habitat or Annex II species. For Annex II aquatic species that range over wide areas, sites must clearly identify areas that represent the physical and biological factors essential to these species' life and reproduction. Socio-economic factors are not taken into account in the identification of sites to be proposed to the European Commission.

While some wide-ranging highly mobile aquatic species have clearly-defined breeding/nurturing/feeding areas (i.e. areas 'essential to their life and reproduction'), the harbour porpoise is a naturally widely-distributed cetacean in European North Atlantic waters, and relatively little is known about its breeding behaviour. In addition, there are few obvious natural site boundaries for mobile species in the open sea. In practice, therefore, Article 4 of the Habitats Directive, which requires Member States to propose sites for Annex II species, and Annex III (site selection criteria) have proved difficult to apply to this species.

To address this problem, the European Commission (EC) held a workshop involving experts in December 2000 and published guidance on the designation of SACs for harbour porpoise in 2007 (EC, 2007). The guidance states that '*it is possible to identify areas representing crucial factors for the life cycle of this species. These areas would be identifiable on the basis of:*

- *the continuous or regular presence of the species (although subject to seasonal variations);*
- *good population density (in relation to neighbouring areas);*
- *high ratio of young to adults during certain periods of the year and*

¹ http://www.central2013.eu/fileadmin/user_upload/Downloads/Document_Centre/OP_Resources/HABITAT_DIRECTIVE_92-43-EEC.pdf

² <http://www.legislation.gov.uk/nisr/1995/380/contents/made> with amendments

³ http://www.legislation.gov.uk/uksi/2007/1842/pdfs/ukxi_20071842_en.pdf

- *other biological elements are characteristic of these areas, such as very developed social and sexual life.*

The guidance also states that *'defining boundaries for 'sites' in offshore waters which support a given percentage of the national population of some mobile species may be difficult due to the lack of obvious natural boundaries (such as coast, topographical boundaries, etc.) in the open sea. This criterion is also challenging to use in the offshore marine environment where populations may often be distributed across several national boundaries.'* Therefore, the application of these additional criteria has also proven difficult.

In addition to information on the Annex II species hosted within the site, this document contains;

- i) a map of the site;
- ii) its name, location and extent;
- iii) the data resulting from application of the criteria specified in Annex III (Stage 1) to the Habitats Directive.

In preparing this document, DAERA and JNCC have taken into consideration the format established by the European Commission, under which the Member States are required to provide site information to the Commission when proposing candidate SACs. This format is set out in the 'Natura 2000 Standard data form'⁴ (prepared by the European Topic Centre for Biodiversity and Nature Conservation on behalf of the European Commission to collect standardised information on SACs throughout Europe).

⁴ The Standard Data Form template is available here: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32011D0484&from=EN>

2. Background to identification of harbour porpoise Special Areas of Conservation in UK waters

The Joint Cetacean Protocol (JCP) was created in 2004 and is amongst the largest collation of standardised survey data on harbour porpoise in the world, comprising 39 data sources with data from at least 545 distinct survey platforms (ships and aircraft) representing over 1.05 million km of survey effort (coverage) over an 18-year period from 1994-2011. DHI Water Environments (UK) Ltd (DHI) were contracted by JNCC to undertake an analysis of these data in order to determine if persistent areas of high harbour porpoise density were present in the wider UK seas (Heinänen and Skov, 2015). This study will hereafter be referred to as the DHI analysis/model.

Partly to ensure geographic representation, UK waters were divided into three Management Units (MUs)⁵ identified by the Interagency Marine Mammal Working Group (IAMMWG): the North Sea (NS), the Celtic and Irish Seas (CIS) and West Scotland (WS). These MUs align with the UK parts of the Assessment Units⁶ proposed for the harbour porpoise by the International Council for the Exploration of the Sea (ICES) in their advice to OSPAR. The Management Units were selected to combine what we understand of the ecology of harbour porpoise with the practicality of managing human activities.

The DHI analysis modelled the relationship between environmental variables and the observed harbour porpoise distribution to develop distribution models in each MU. These models described discrete areas of predicted high porpoise density and captured the year-to-year variation within the different locations. Areas within the MUs that were identified to persistently have the top 10% of predicted high densities of harbour porpoise were considered in detail in the analysis. Areas of Search (AoS), within which the final SAC boundaries would be identified, were selected based on these top 10% of predicted high density areas. The top 10% areas were filtered by model confidence and areas of less than 500km² were removed on the grounds that such small areas are ineffective for harbour porpoise conservation in relation to the much larger AoS identified in the Management Units. Sites within the AoS were restricted to higher confidence areas only.

Sufficiency, seasonality and geographic spread of sites were considered in order to identify a network of recommended draft SACs (rdSACs). Sufficiency thresholds of 20% of the nominal UK harbour porpoise abundance and 10-14% of the UK habitat for the species⁷ within the rdSACs of each MU were met.

A UK network of sites for harbour porpoise was submitted to Governments as draft SACs (dSACs) in June 2015. Once the sites gain approval from Governments to go to consultation, the classification changes from dSACs to possible SACs (pSACs), once submitted to the European Commission they are classed as candidate SACs (cSACs). The Governments of Wales and Northern Ireland, and Defra on behalf of England and offshore decided to proceed to consultation with five of the sites (Figure 1), subject to an adjustment to the North Channel SAC boundary. This adjustment reflected the decision by Scottish Ministers not to proceed with pSACs in their waters at that time. Together with the existing Skerries & Causeway SAC (grade C for harbour porpoise), these five sites cover 10.3% of the UK habitat and 18.7% of the UK population⁸ of harbour porpoises, and are distributed in territorial and offshore waters throughout the North Sea MU and the Irish and Celtic Sea MU. In addition, there are 34 UK SACs which already list harbour porpoise as a non-qualifying feature (grade D) in UK waters. The five sites consulted on were submitted to the European Commission as cSACs on 30th January 2017.

Along with all other Member States, the UK has legal obligations to protect harbour porpoises throughout the territory over which it exercises sovereignty. The network of protected sites will contribute towards

⁵ IAMMWG, 2015. Management Units for cetaceans in UK waters (January 2015). JNCC Report No. 547, JNCC Peterborough. 37pp.

⁶ ICES. 2014 available from

http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2014/WGMME/wgmme_2014.pdf

⁷ IAMMWG, 2015. The use of harbour porpoise sightings data to inform the development of draft Special Areas of Conservation in UK waters. JNCC Report No. 565, JNCC Peterborough. 29pp.

⁸ UK habitat for harbour porpoise is considered the UK continental shelf which is approximated by waters of 200m depth or less.

maintaining the favourable conservation status of the wider population of harbour porpoise. Alongside and in addition to the identification of the network of harbour porpoise sites, an overarching conservation strategy⁹ has been in place for harbour porpoise since 2000. This was further reviewed in 2009 and will continue to be reviewed and updated where necessary.

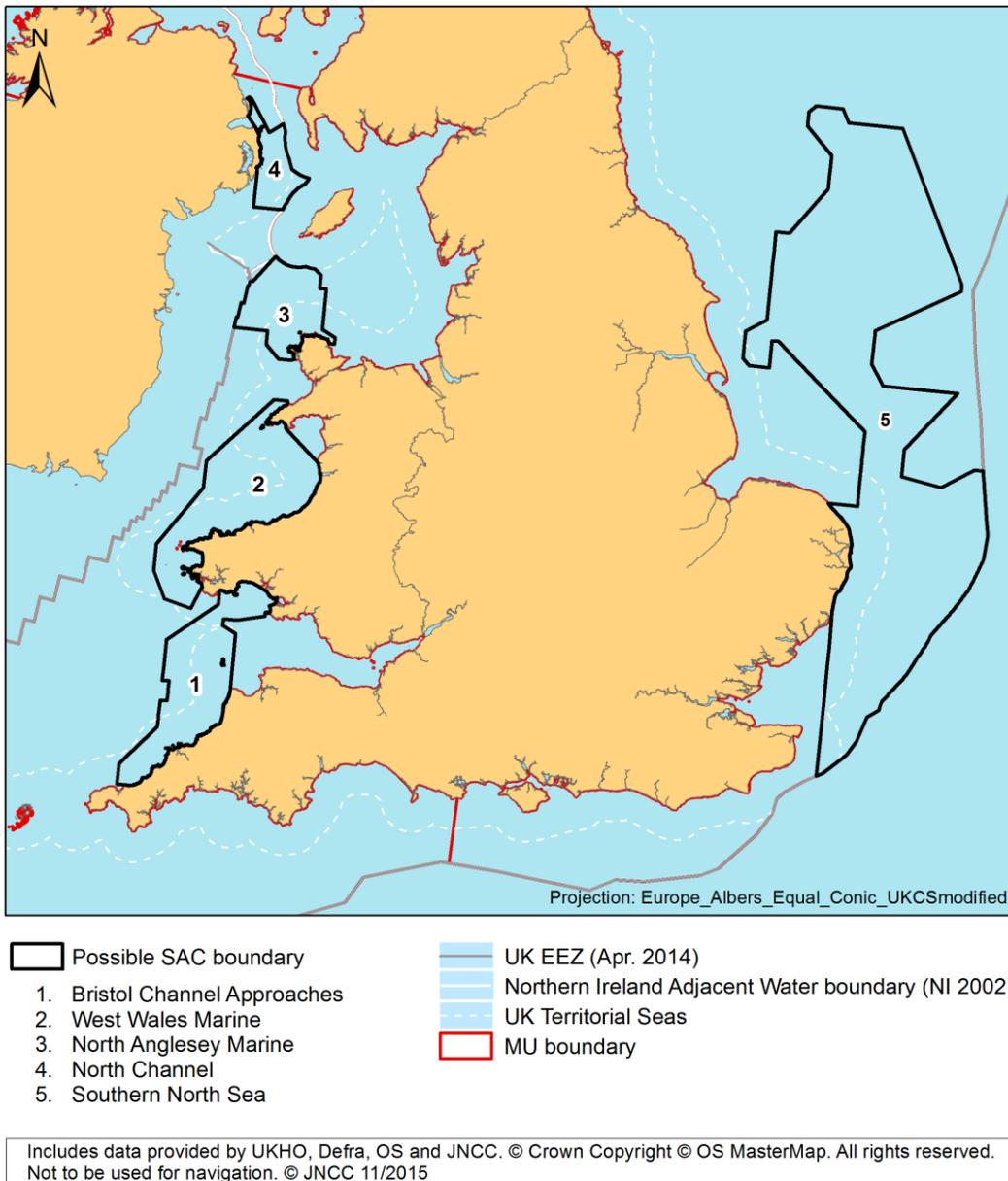


Figure 1: A network of five possible SACs (pSACs) for harbour porpoise in Wales, England, Northern Ireland and offshore waters.

⁹ DETR. 2000. A UK conservation strategy for the harbour porpoise (*Phocoena phocoena*). Department for the Environment Transport and the Regions; Ministry of Agriculture, Fisheries and Food; Scottish Executive Rural Affairs Department; Department of Agriculture and Rural Development (Northern Ireland); National Assembly for Wales Environment Division; Department of the Environment in Northern Ireland

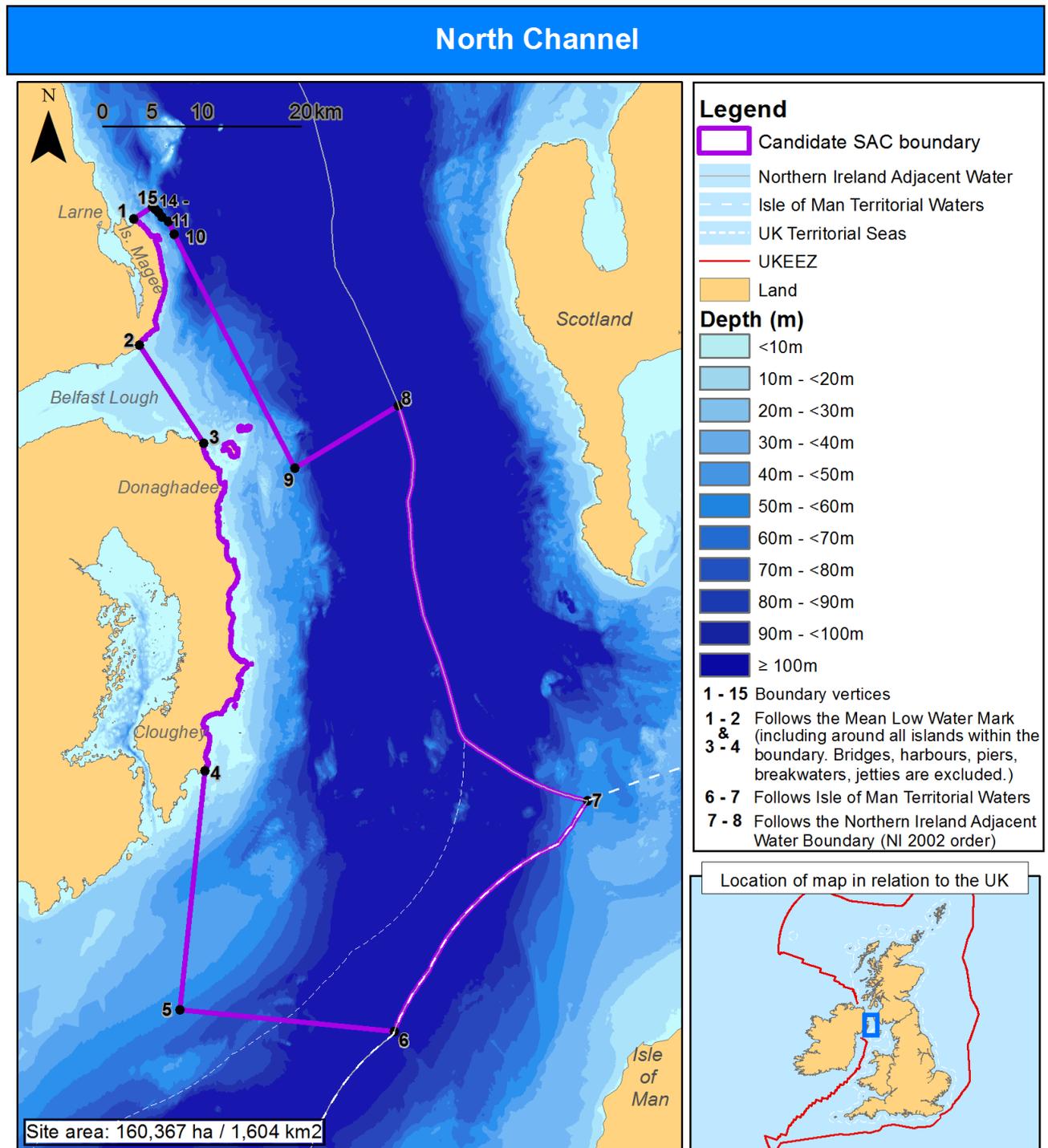
3. North Channel SAC: Site Information

Site name North Channel	Site centre location 54°27'19.8"N, 05°17'37.1"W (Datum: WGS 1984)
Site surface area 160,367ha / 1,604km ² (Datum: Europe Albers Equal Area modified to UK, calculated in ArcGIS)	Biogeographic region Atlantic
Administrative Region Northern Ireland inshore waters (DAERA) UK offshore waters (JNCC)	Percentage cover within region Northern Ireland inshore waters: 85% Offshore waters: 15%

4. Interest feature(s) under the EU Habitats Directive

1351: [Harbour porpoise \(*Phocoena phocoena*\)](#)

5. Map of Site



Includes data provided by UKHO, Open StreetMap, Defra and JNCC. © Crown Copyright © OpenStreetMap contributors. All rights reserved. Not to be used for navigation. © JNCC 01/2017

ID	Latitude	Longitude	ID	Latitude	Longitude	ID	Latitude	Longitude
1	54° 51' 34.7" N	5° 45' 46.6" W	6	54° 11' 30.7" N	5° 5' 8.3" W	11	54° 51' 50.6" N	5° 42' 33.9" W
2	54° 44' 55.9" N	5° 42' 33.0" W	7	54° 25' 59.8" N	4° 52' 7.7" W	12	54° 52' 1.0" N	5° 43' 14.3" W
3	54° 40' 30.7" N	5° 34' 37.0" W	8	54° 44' 48.0" N	5° 17' 30.8" W	13	54° 52' 11.2" N	5° 43' 35.8" W
4	54° 23' 6.4" N	5° 27' 40.7" W	9	54° 40' 16.0" N	5° 25' 43.8" W	14	54° 52' 19.8" N	5° 43' 59.1" W
5	54° 10' 8.4" N	5° 25' 0.3" W	10	54° 51' 14.4" N	5° 41' 45.0" W	15	54° 52' 25.8" N	5° 44' 21.3" W

6. Site summary

The area included within the site covers important winter habitat which emerged as one of the top 10% persistent high-density areas for this season in the UK. The site also includes a 2 to 8km wide strip from Mew Island (Copelands) near Donaghadee to Island Magee, near Larne. The area within this strip is supported by land-based sightings data presented in Appendix I ('*Supplementary data for the North Channel pSAC*'). The strip includes locations where some of the largest groups of harbour porpoise have been counted in Northern Ireland over the period from 1996 to 2014, ranging from 20 to 100 individuals in any one count. Constant effort data from watch points along this coastal strip, compared to watch points elsewhere in Northern Ireland, indicates that this is the best location in Northern Ireland for harbour porpoise sightings. Furthermore the modelling data from DHI (Heinänen & Skov, 2015) indicates that there is a small coastal strip in this locality which is within the top 10% of high density areas for harbour porpoise in the summer, although the associated confidence is low.

The North Channel site comprises an area of 1,604km². The site is located along part of the east coast of Northern Ireland from Island Magee in the north to south of Cloughey. It extends across the northern part of the Irish Sea, with its southern edge bordering Isle of Man waters and the eastern edge following the Northern Ireland Adjacent Water boundary. It is located within the Celtic and Irish Seas harbour porpoise MU¹⁰.

The water depths within the site range from mean low water springs at the coast to depths of around 150m in the northern and eastern parts of the site. Shallower areas occur near the coast with depths mostly between 10 and 40m. Beyond these shallower areas close to the coast, the water depth ranges between 50 and 130m. Varied seabed substrate types mosaic the site (EUNIS level 3, EUSeaMap¹¹). The sea bed along the Northern Ireland coast comprises mainly coarse sediments, sands and mixed sediments close to shore. Further away from the coast towards the North Channel and north Irish Sea the sea bed is predominantly coarse sediments and sand, with pockets of mixed sediment and moderate and high energy circalittoral rock, and there is a large expanse of mud in the south-west corner of the site.

Defining habitats of cetaceans is problematic; this is primarily due to their highly mobile nature and their distribution being driven mainly by the distribution and availability of their prey. In the absence of prey data, relationships between habitat variables (such as depth, water temperature, seabed sediment etc.) are often used as proxies of prey distribution (e.g. Marubini *et al*, 2009; Skov & Thomsen, 2008; Embling *et al*, 2010). Regional variation in these relationships between habitat variables occurs and was evident between the Management Units in the analyses undertaken by DHI.

The analyses undertaken by DHI used several different environmental variables and modelled them against observed density of harbour porpoise for each MU. In all MUs, the coarseness of the seabed sediment was important with porpoises showing a preference for coarser sediments (such as sand/gravel) rather than fine sediments (e.g. mud). Similar habitat associations have been made in the eastern part of the North Sea (Skov *et al*, 2014). Sandeels (*Ammodytidae*), which are known prey for harbour porpoises, exhibit a strong association with particular surface sediments (Benke & Siebert, 1996; Santos, 1998). Fine particle fractions have been demonstrated to limit the distribution of the lesser sandeel (*Ammodytes marinus*) around the Shetland Isles (Wright *et al*, 2000). Harbour porpoise feed on a wide variety of fish and generally focus on the most abundant local species. The predominant prey type appears to be bottom-dwelling fish such as sandeels, although shoaling fish such as mackerel (*Scomber scombrus*) and herring (*Clupea harengus*) are also taken (Santos & Pierce, 2003; Pierce *et al*, 2007).

¹⁰ IAMMWG, 2015. Management Units for cetaceans in UK waters (January 2015). JNCC Report No. 547, JNCC

¹¹ <http://www.emodnet-seabedhabitats.eu/>

For the Celtic and Irish Seas MU, the DHI model results for both the summer and winter seasons show water depth and variables within the water column (particularly current speed in the winter) are the most important physical factors that increase the probability of presence and density of harbour porpoise. The predicted densities of harbour porpoise show considerable variation during the periods they spend in offshore waters and more persistent pattern in coastal areas. There is an indication that the harbour porpoises within the Celtic and Irish Seas MU have a preference to water depths shallower than 40m. Areas of higher eddy activity (turbulence) were preferred along with tidal current speeds of 0.4-0.6m/s, although faster currents (0.8-1.0m/s) were also used in the summer. Lower densities of harbour porpoise were found in areas with high levels of shipping traffic (based on a threshold of approximately 50 ships per day) in the summer.

The physical characteristics of the North Channel site are well aligned to the predictors determined from the DHI model. Much of the site incorporates shallow depths of less than 40m (section 5) and the seabed energy layer of EU Seemap¹² indicates that most of the site is of moderate energy. In particular the coastal strip from the Copelands to south of Cloughy on the Northern Irish coast have higher current energy, where it can be expected that eddy activity (turbulence) is higher.

The North Channel site is located in the Celtic and Irish Seas harbour porpoise MU¹³ and contains the Annex II species harbour porpoise as a qualifying species. Additionally, three other sites; North Anglesey Marine / Gogledd Môn Forol, West Wales Marine / Gorllewin Cymru Forol and Bristol Channel Approaches / Dynesfeydd Môr Hafren, make up a series of sites proposed for Annex II harbour porpoise within this MU.

7. Site boundary

To date, the guidance developed by JNCC for defining SAC boundaries for marine sites away from the coast has focused on habitat features, largely from modelled data. The harbour porpoise sites are also, in part, based on modelled data and the outputs predict areas with expected high densities of harbour porpoise. The outputs from this approach and that for habitat features are consequently similar. Therefore, the guidelines have largely been transferred to consideration of boundaries for harbour porpoise sites:

1. As a general principle, site boundaries should be drawn closely around the qualifying feature for which the sites have been selected, taking into account the need to ensure that the site operates as a functional whole for the conservation of the feature;
2. Where possible, the seaward boundaries of the sites should be drawn using straight lines to ensure ease of identification on charts and at sea (and thereby minimising the number of nodes in the boundary where feasible);
3. However, a balance is needed between more complex site shapes drawn more tightly around the feature and simple square/rectangular boundaries so that the area of 'non-interest-feature' included within the site boundary is minimised, but this should not be to the detriment of the structural and functional integrity of the interest feature;
4. Site boundary coordinates be provided in degrees, minutes, seconds.

The nature of the boundaries for the recommended draft SAC were 'blocky' due to their emergence from the 25km² gridded model output of the DHI analysis (5km x 5km grid squares). Additional principles for creating boundaries for the harbour porpoise sites were also needed:

5. Diagonal runs of pixels (the DHI grid squares) should be straightened by a line that approximates the centre of the diagonal;
6. Vertical and horizontal lengths of more than two pixels of the sites were maintained whenever possible to preserve overall shape;

¹² Phase 1 energy layers are available for download from EUSeaMap: <http://www.emodnet-seabedhabitats.eu/default.aspx?page=1953>

¹³ IAMMWG, 2015. Management Units for cetaceans in UK waters (January 2015). JNCC Report No. 547, JNCC Peterborough.

7. Modifications of the boundary of each recommended draft SACs should not alter the total area of the site by more than approximately 5%;
8. Candidate SACs will not extend into rivers;
9. Estuaries are excluded where the width of the entrance is ≤ 2 km and the model did not indicate the area was included;
10. The 'coastal' edge of sites is defined by the Mean Low Water (MLW) tide line;
11. Site boundaries were aligned with the EEZ boundary where they were closely aligned.

For the North Channel site, the boundary was delineated by combining the top 10% of persistent high density areas of harbour porpoise from the winter (as described in the background section) that were present within this vicinity. An extension to the site was proposed by DAERA and incorporated: it comprises a 2 to 8km wide coastal strip running from 2km off Island Magee, broadening to form a 7 to 8 km wide corridor, across the entrance to Belfast Lough and continues 2km offshore from Mew Island (Copelands). This encloses known important local areas for harbour porpoise, incorporates the potential for movement of individuals between Portmuck near the northern end of Island Magee, Black Head at the northern extent of Belfast Lough and the Copeland Islands to the south. The areas included within this extension are supported by land-based sightings data presented in Appendix I.

8. Assessment of interest feature against selection criteria

8.1. Harbour porpoise (*Phocoena phocoena*)

Annex III selection criteria for Annex II Species: Stage 1B

Stage 1 of Annex III of the Habitats Directive refers to the assessment at national level of the relative importance of sites based on:

- (a) Size and density of the population of the species present on the site in relation to the populations present within national territory.
- (b) Degree of conservation of the features of the habitat which are important for the species concerned and restoration possibilities.
- (c) Degree of isolation of the population present on the site in relation to the natural range of the species.
- (d) Global assessment of the value of the site for conservation of the species concerned.

As UK waters are divided into Management Units to ensure geographic coverage and to facilitate management for harbour porpoise, each site has been assessed in relation to the MU rather than at the national level.

a) Proportion of UK part of the Celtic and Irish Seas Management Unit population¹⁴

Abundance estimates calculated for each site were used directly to grade criterion iii a) *Size and density of the population of the species present on the site in relation to the populations present within national territory*. The identification of SACs for harbour porpoise has been driven by assessments at the scale of national territory within Management Units to ensure sites constitute a geographically *representative* network; the criterion has been applied at this scale.

The explanatory notes to the Natura 2000 standard data form suggest the following ranking to grade the sites based on the size of the population in the site relative to the population in the national territory

¹⁴ UK MU population is defined throughout this document by reference to the UK portion of the MU where water depths are 200m or less.

(criterion III (a)) and for the purpose of harbour porpoise candidate SACs, relative to the relevant UK management unit:

Grade A: >15% to 100% of the relevant UK management unit population

Grade B: >2% to 15% of the relevant UK management unit population

Grade C: >0% to 2% of the relevant UK management unit population

The candidate SACs are '*clearly identifiable*' based on the modelling and persistence analyses undertaken by DHI. The analytical approach taken by DHI incorporated some of the sub-criteria of the European Commission guidance for identifying sites for marine mobile species (EC, 2007), such as sub-criteria '*Continuous or regular presence of the species (although subject to seasonal variations)*', '*Good population density (in relation to neighbouring areas)*' and some elements of sub-criteria '*Other biological elements that are characteristics, such as very developed social and sexual life*'. All of the sites have regular presence of harbour porpoise, whilst some show seasonal variation. It was not possible to assess the ratio of young to adults because data have not been collected consistently at an appropriate scale. The abundance within the candidate SACs can be estimated from existing survey data (Hammond *et al*, 2013) and thereby Criterion III (a) can be applied directly for the purposes of grading the site.

The North Channel site was identified as being within the top 10% of persistent high density areas for harbour porpoise in UK waters during the winter season (Heinänen & Skov, 2015). It is estimated (based on the SCANS-II survey which took place in July 2005 only) that the site supports approximately 537 individuals (95% Confidence Interval: 276 - 1046) for at least part of the year, as seasonal differences are likely to occur, and represents approximately 1.2% of the population within the UK part of the Celtic and Irish Seas MU. It should be noted that because this estimate is from a one-month survey in a single year it cannot be considered as a specific population number for the site. It is not appropriate to assign a site population estimate because of the daily and seasonal movements of the animals.

The DHI analysis showed high confidence in the modelling across the majority of the site during the winter season. A small proportion of the area (the coastal strip between Mew Island [Copelands] near Donaghadee and Island Magee near Larne) was within the top 10% of persistent high density areas for summer months but it had an associated low degree of confidence. However, land based observations add supporting evidence for its inclusion and these data are presented in Appendix I. One of the locations included in this data set (Port Muck, Island Magee) was also identified by Evans *et al*, (2015) as being one of the UK land-based survey locations that had harbour porpoise counts per hour above the 90th percentile (i.e. in the top 10% of land-based survey locations analysed¹⁵).

Therefore the North Channel site has been identified as an important area for harbour porpoise during the winter season. Based on the figure of 1.2% of the Celtic and Irish Seas MU population it would be rated as grade C on the basis of the EC standard data form (C = >0% to 2% of the UK part of the MU population).

b) Degree of conservation of the features of the habitat which are important for the species concerned and restoration possibilities

The five sites (Figure 1) cover approximately 10.3% of available porpoise habitat (continental shelf) and porpoise densities within this network are amongst the highest modelled for the population as indicated by the DHI analysis. This supports the notion that these areas, relative to the rest of the continental shelf, include the best habitat for harbour porpoises and have been used persistently over the last two decades. It is assumed that the preference for these habitats is associated with good feeding opportunities and prey aggregations. The available evidence indicates that the conservation status of the UK harbour porpoise population is currently Favourable¹⁶. Therefore, it is considered that the conservation of the feature in all the sites is graded as II (elements are well conserved), and 'restoration

¹⁵ Amongst the sites examined that had more than 5 hours of effort (> 100minutes per year for three or more years)

¹⁶ http://jncc.defra.gov.uk/pdf/Article17Consult_20131010/S1351_UK.pdf

possibilities' do not have to be considered. Therefore, the overall grade for this criterion is at least grade B. We do not know which features of the habitat are the most important drivers of the association with prey; nor do we know what the main prey species of porpoise within the sites are. Until this is known, the quality of the habitat (good or excellent) cannot be determined, so a grade of A/B has been awarded.

Therefore, with respect to the degree of conservation of the features of the habitat important for harbour porpoises, the North Channel site would be graded A/B ('Excellent'/'Good conservation') overall, without the necessity for consideration of restoration possibilities.

c) Degree of isolation of the population present on the site in relation to the natural range of the species

As a wide-ranging species, the animals within the site cannot be considered isolated in relation to the rest of the population. Animals within the site are part of the wider MU population.

Therefore, with respect to isolation, the North Channel site would be graded C: population not isolated within extended distribution range.

d) Global assessment

In addition to assessing the above criteria, the global assessment can also consider other features of the site thought to be relevant for a given species and a 'best expert judgment' may also be used for this global evaluation (EC, 2011). The North Channel site increases the geographic coverage of SACs for harbour porpoise further north in the Celtic and Irish Seas MU. Furthermore, it increases the seasonality as a persistent high density area for the winter season and complements the North Anglesey Marine pSAC, which is a persistent high density area for the summer season. The North Channel site therefore has value in representing the biogeographic range of the species in the UK.

Therefore, the North Channel site is considered to have a global grade B, i.e. within the context of the UK Celtic and Irish Seas management unit. It covers an important and persistent high density area for the winter season in the west of the UK, including important areas for harbour porpoise in the waters of Northern Ireland.

Summary of grades for Stage 1B criteria

	Proportion of UK MU Population (a)	Conservation of features (b)	Isolation of population (c)	Global assessment (d)
North Channel	C	A/B	C	B

9. Supporting scientific documentation

The process leading to the selection of the North Channel site was based on a combination of observed data and predictive modelling (Heinänen & Skov, 2015). The study investigated whether persistent high density areas of harbour porpoise could be identified in UK waters, using 18 years (1994 to 2011) of sea-based Joint Cetacean Protocol (JCP) data covering the entire UK EEZ.

The JCP assembled disparate effort-related cetacean sightings datasets from European / north-east Atlantic waters and included those from all major UK sources e.g. 'Small Cetacean Abundance in the North Sea and adjacent waters' SCANS & SCANS-II from 1994 and 2005 respectively (Hammond *et al.* 2002; Hammond *et al.* 2013); 'Cetacean Offshore Distribution and Abundance in European Atlantic' CODA surveys from 2007 (CODA, 2009); European Seabirds At Sea (ESAS), which collected and collated seabird and cetacean data from the majority of countries with a north-west European coastline between 1979 and 1999, with ad hoc surveys beyond 1999; Sea Watch Foundation (SWF; i.e. NGO led surveys); Atlantic Research Coalition (ARC); and from other non-governmental and marine renewable industry sources.

The DHI report addressed challenges, such as variable survey coverage in different parts of the UK EEZ within the study period, by developing statistical distribution models capable of predicting seasonal and yearly means. Where there were sufficient data, models were run for two seasons: summer and winter for each MU.

Data on concentrations of prey of harbour porpoises were not available for the entire EEZ at a fine spatial scale (5km). Therefore, physical oceanographic properties of currents, water masses and the seafloor were used as variables in the model. It is assumed that these variables affect the probability of harbour porpoises encountering prey. Mean shipping intensity was also included in the model to account for some anthropogenic disturbance.

The DHI model results indicate that densities of harbour porpoises are influenced by both oceanographic and pressure variables. The degree of influence of these factors varies in different parts of UK waters and with the different seasons. Analyses of the persistency of high density areas integrated evaluations of the number of years that high densities were predicted for an area, with evaluations of the degree of recent high densities as predicted by the distribution models. Due to the uneven survey effort over the period, the uncertainty in modelled distributions varied greatly. Robust model predictions (based on relative standard errors) were found in most parts of the Irish Sea and Welsh coastal waters.

The areas included within the 2 - 8km wide strip along the Northern Ireland coastline are supported by land-based sightings validated data held by the Irish Whale and Dolphin Group. Further supporting data are provided in the supplementary information for the site (Appendix I).

An additional contract was let to a team led by the Sea Watch Foundation in 2013. This study used effort-related land-based observations to determine if concentrations of porpoises occur in near shore waters (within 1nm of the coast line) (Evans *et al*, 2015). These analyses could not model distributions in the same way as DHI due to the nature of the data. However, observation locations could be ranked in terms of numbers of porpoise seen per standardised time period. One of the locations included within the Irish Whale and Dolphin Group's dataset was also identified as being in the top 10% of land-based observation sites in analyses by Evans *et al*. (2015).

References

- BENKE, H., AND SIEBERT, U. 1996. The current status of harbour porpoises (*Phocoena phocoena*) in German waters. Reports of the International Whaling Commission, SC/47/SM49.
- CODA. 2009. Cetacean Offshore Distribution and Abundance in the European Atlantic. Final Report. 43pp. [Available from http://biology.st-andrews.ac.uk/coda/documents/CODA_Final_Report_11-2-09.pdf]
- EC. 2007. Guidelines for the establishment of the Natura 2000 network in the marine environment. Application of the habitats and Birds Directives. [Available from: http://ec.europa.eu/environment/nature/natura2000/marine/docs/marine_guidelines.pdf]
- EMBLING, C. B., GILLIBRAND, P. A., GORDON, J., SHRIMPTON, J., STEVICK, P. T., and HAMMOND, P. S. 2010. Using habitat models to identify suitable sites for marine protected areas for harbour porpoises *Phocoena phocoena*. *Biological Conservation*, **143**, 267–279.
- EVANS, P.G.H., PIERCE, G.J., VENERUSO, G., WEIR, C.R., GIBAS, D., ANDERWALD, P. and BEGOÑA SANTOS, M. 2015. Analysis of long-term effort-related land-based observations to identify whether coastal areas of harbour porpoise and bottlenose dolphin have persistent high occurrence & abundance. JNCC report No. 543, JNCC, Peterborough.
- HAMMOND, P. S., BERGGREN, P., BENKE, H., BORCHERS, D. L., COLLET, A., HEIDE-JORGENSEN, M. P., HEIMLICH, S., HIBY, A. R., LEOPOLD, M. F. and ØIEN, N. 2002 Abundance of harbour porpoise and other cetaceans in the North Sea and adjacent waters. *Journal of Applied Ecology*, **39**, 361–376.
- HAMMOND, P.S., MACLEOD, K., BERGGREN, P., BORCHERS, D.L., BURT, L., CAÑADAS, A., DESPORTES, G., DONOVAN, G.P., GILLES, A., GILLESPIE, D., GORDON, J., HIBY, L., KUKLIK, I., LEAPER, R., LEHNERT, K., LEOPOLD, M., LOVELL, P., ØIEN, N., PAXTON, C.G.M., RIDOUX, V., ROGAN, E., SAMARRA, F., SCHEIDAT, M., SEQUEIRA, M., SIEBERT, U., SKOV, H., SWIFT, R., TASKER, M.L., TEILMANN, J., van CANNEYT, O. and VÁZQUEZ, J.A. 2013. Cetacean abundance and distribution in European Atlantic shelf waters to inform conservation and management. *Biological Conservation*, **164**, 107–122
- HEINÄNEN, S and SKOV, H. 2015. The identification of discrete and persistent areas of relatively high harbour porpoise density in the wider UK marine area, JNCC Report No. 544, JNCC, Peterborough.
- MARUBINI, F., GIMONA, A., EVANS, P. G., WRIGHT, P. J., and PIERCE, G. J. 2009. Habitat preferences and interannual variability in occurrence of the harbour porpoise *Phocoena phocoena* off northwest Scotland. *Marine Ecology Progress Series*, **381**, 297–310.
- PIERCE, G. J., SANTOS, M. B. and CERVINO, S., 2007. Assessing sources of variation underlying estimates of cetacean diet composition: a simulation study on analysis of harbour porpoise diet in Scottish (UK) waters. *Journal of the Marine Biological Association*, **87**, 213–221.
- SANTOS, M. B. 1998. *Feeding ecology of harbour porpoises, common and bottlenosed dolphins and sperm whales in the northeast and Atlantic*. PhD thesis, School of Biology, University of Aberdeen, Scotland.
- SANTOS, M. B. and PIERCE, G. J. 2003. The diet of harbour porpoise (*Phocoena phocoena*) in the northeast Atlantic. *Oceanography and Marine Biology: an Annual Review* 2003, 41: 355–390.
- SKOV, H. and THOMSEN, F. 2008. Resolving fine-scale spatio-temporal dynamics in the harbour porpoise *Phocoena phocoena*. *Marine Ecology Progress Series*, **373**, 173–186.

SKOV, H., HEINÄNEN, S., HANSEN, D.A., LADAGE, F., SCHLENZ, B., ZYDELIS, R. and THOMSEN, F. 2014 Habitat Modelling. Pp. 102–112 in: BSH & BMU (2014). *Ecological Research at the Offshore Windfarm alpha ventus - Challenges, Results and Perspectives*. Federal Maritime and Hydrographic Agency (BSH), Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU). Springer Spektrum. 180 pp.

WRIGHT, P.J., JENSEN, H. and TUCK, I. 2000. The influence of sediment type on the distribution of the lesser sandeel, *Ammodytes marinus*. *Journal of Sea Research* **44**, 243–256.

Appendix I: Supplementary data for the North Channel pSAC

The inclusion of the 2 - 8km wide strip along the Northern Ireland coastline in the North Channel pSAC is supported by land-based sightings data, validated and stored by the Irish Whale and Dolphin Group (IWDG). This has been used to create the tables below.

Table 1.

Constant effort data from watch points in this part of the North Channel site have been compared to others elsewhere in Northern Ireland and the rest of Ireland. The data are arranged in order of sites with the highest average sightings per hour (for harbour porpoise). Portmuck emerges as the best site in Northern Ireland (and Ireland) based on constant effort records where a substantial series of 100 minute counts in all months of the year has occurred. Nearby Black Head has also scored highly and is the second best site in Northern Ireland based on constant effort records.

Tables 2. & 3.

These tables contain the same information presented in two different orders. They include sites where the largest groups of harbour porpoise have been counted from 1996 to 2014, ranging from 20 to 100 individuals in any one count. The data are from constant effort and ad hoc sightings. The Copelands, Black Head and Portmuck all feature strongly as locations where these large groups are observed along the Northern Ireland coastline. The highest group count ever recorded in Northern Ireland is a record of 100 harbour porpoises at The Copelands in October 2007. Around Ireland, since 2004, only a small number of sites have recorded porpoises in numbers on the same scale as the Copeland Islands. These include 70 at Sleah Head, County Kerry and 60 at Galley Head and 150 at Cape Clear, both in County Cork. Based on data examined, The Copelands have logged the second highest group count ever noted in the whole of Ireland and an overall series of high counts equal to any of the other top sites around the island. Of 31 Northern Ireland high counts of 25 or more animals, The Copelands feature eighteen times, Portmuck has five high counts and Black Head has three. Collectively the extension has 26 out of 31 (84%) highest counts for Northern Ireland.

Table 1: Harbour Porpoise constant effort data for Northern Ireland and the rest of Ireland.

Watch points that fall within the North Channel site are high-lighted in green. Sites that are within Northern Ireland waters are in bold. Data from a number of watch points elsewhere in Ireland have been included where a reasonable number of hours of observation have been logged and represent west, south and east coasts. They help to add further context to the records from the North Channel. Sites are arranged in order of highest average sightings per hour.

Harbour Porpoise Site	Hours	Sightings	Sightings average/hr	Animals (tally)	Animals average/hr	Maximum count	Designation
Garron Point, Antrim	10.4	8	0.77	53	5.1	24	
Portmuck, Antrim	236	145	0.61	780	3.31	35	pSAC
Killiney Bay, Dublin	51.4	30	0.58	66	1.28	20	
Black Head, Antrim	264.2	136	0.51	606	2.29	30	pSAC
Bloody Bridge, Down	422.3	200	0.47	787	1.86	20	
Fair Hd/Murlough, Antrim	6.8	3	0.44	20	2.94		
Ramore Head/Portrush, Antrim	370.4	164	0.44	340	0.92	25	SAC (Grade C Harbour Porpoise)
Howth Head, Dublin	234.6	101	0.43	282	1.2	25	
Bray Head, Wicklow	172.7	71	0.41	142	0.82	9	
Black Head, Clare	200.3	83	0.41	287	1.43	19	
St John's Point, Down	96	38	0.4	117	1.22	20	
Magilligan, L'Derry	116.3	43	0.37	89	0.77	L Foyle 25	
The Gobbins, Antrim	12.3	4	0.33	6	0.49		pSAC
Ram Head, Waterford	662.6	194	0.29	361	0.54	8	
Port Ballintrae/Runkerry, Antrim	12.6	3	0.24	20	6.67		SAC (Grade C Harbour Porpoise)
Clogher Head, Louth	28.5	6	0.21	11	0.39	5	
Valentia, Kerry	32.6	12	0.18	40	1.23	13	
Hook Head, Wexford	78.1	11	0.14	28	0.36	7	
Dunluce Castle, Antrim	8.5	1	0.12	7	0.82		
Portstewart, Antrim	33.3	4	0.1	10	0.3		
Finaun, Clare	355.5	19	0.05	43	0.12	7	
Ballyquintin Point, Down	69.8	3	0.04	4	0.06		Near pSAC
Copelands, Down						100	pSAC

Table 2: Analysis of high counts - Northern Ireland sites with 20 or more harbour porpoises recorded in one sighting, sorted by site name

Date	Location	Lat	Long	Animals	Association with pSAC
06-Jul-03	Black Head, Antrim	54.7667	-5.6625	30	pSAC
04-Feb-07	Black Head, Antrim	54.7521	-5.676	25	Psac
18-Dec-04	Black Head, Antrim	54.7667	-5.65	25	pSAC
08-Aug-08	Black Head, Antrim	54.77	-5.685	22	pSAC
03-Feb-07	Black Head, Antrim	54.7618	-5.6799	20	pSAC
12-Aug-03	Black Head, Antrim	54.7667	-5.6625	20	pSAC
08-Nov-09	Black Head, Antrim	54.767	-5.682	20	pSAC
26-Sep-09	Bloody Bridge, Newcastle, Down	54.167	-5.847	20	
17-Aug-11	Burr Point, Nr. Ballyhalbert, Ards Peninsula, Down	54.487	-5.39	20	pSAC
29-Aug-03	Copeland Island, Down	54.6972	-5.4778	60	pSAC
11-Oct-11	Copeland Island, Down	54.685	-5.508	50	pSAC
10-Oct-11	Copeland Island, Down	54.709	-5.492	50	pSAC
13-Oct-01	Copeland Island, Down	54.73	-5.3917	50	pSAC
28-Sep-03	Copeland Island, Down	54.6833	-5.4778	40	pSAC
09-Oct-11	Copeland Island, Down	54.707	-5.492	40	pSAC
12-Oct-11	Copeland Island, Down	54.701	-5.503	30	pSAC
06-Oct-11	Copeland Island, Down	54.7065	-5.502	30	pSAC
17-May-11	Copeland Island, Down	54.707	-5.49	30	pSAC
11-Aug-11	Copeland Island, Down	54.72	-5.525	25	pSAC
12-Sep-11	Copeland Island, Down	54.693	-5.479	23	pSAC
16-Oct-09	Copeland Island, Down	54.701	-5.517	22	pSAC
04-Aug-01	Copeland Island, Down	54.6933	-5.5256	20	pSAC
19-May-01	Copeland Island, Down	54.6939	-5.5228	20	pSAC
30-Aug-03	Copeland Island, Down	54.6972	-5.4778	20	pSAC
07-Oct-11	Copeland Island, Down	54.711	-5.501	20	pSAC
04-Oct-11	Copeland Island, Down	54.711	-5.491	20	pSAC
06-Jun-08	Copeland Island, Down	54.716	-5.471	20	pSAC

Date	Location	Lat	Long	Animals	Association with pSAC
07-Oct-07	Copelands, Light House Island, Down	54.698	-5.525	100	pSAC
05-Sep-07	Copelands, Light House Island, Down	54.708	-5.524	60	pSAC
17-Sep-06	Copelands, Light House Island, Down	54.7039	-5.515	45	pSAC
06-Sep-07	Copelands, Light House Island, Down	54.703	-5.519	43	pSAC
15-Sep-06	Copelands, Light House Island, Down	54.7031	-5.5019	35	pSAC
28-Oct-06	Copelands, Light House Island, Down	54.7	-5.525	30	pSAC
08-Oct-07	Copelands, Light House Island, Down	54.698	-5.53	25	pSAC
30-Jun-14	Copelands, North Channel	54.901	-5.489	25	pSAC
24-Aug-07	Garron Point, Antrim	55.079	-5.9	24	
21-Jun-03	Lough Foyle, Derry	55.2333	-6.8	25	
11-Sep-09	Maiden Islands, Antrim	54.944	-5.717	70	near pSAC
04-Aug-01	Maiden Islands, Antrim	54.9333	-5.7189	35	near pSAC
10-Jul-11	Maiden Islands, Antrim	54.913	-5.729	25	near pSAC
23-Dec-06	Portmuck, Island Magee, Antrim	54.8575	-5.7186	35	pSAC
01-Sep-14	Portmuck, Island Magee, Antrim	54.851	-5.721	29	pSAC
24-Nov-12	Portmuck, Island Magee, Antrim	54.856	-5.718	26	pSAC
05-Oct-05	Portmuck, Island Magee, Antrim	54.8556	-5.7167	25	pSAC
19-May-11	Portmuck, Island Magee, Antrim	54.856	-5.712	25	pSAC
06-Dec-11	Portmuck, Island Magee, Antrim	54.853	-5.712	23	pSAC
13-Aug-11	Portmuck, Island Magee, Antrim	54.855	-5.721	23	pSAC
04-Jan-13	Portmuck, Island Magee, Antrim	54.845	-5.711	22	pSAC
11-Apr-04	Portmuck, Island Magee, Antrim	54.855	-5.71	21	pSAC
24-Aug-13	Portmuck, Island Magee, Antrim	54.851	-5.718	20	pSAC
17-Dec-06	Portmuck, Island Magee, Antrim	54.8547	-5.7197	20	pSAC
13-Jul-04	Portrush, Antrim	55.2083	-6.65	25	
12-Jul-13	St. John's Point, Down	54.223	-5.648	20	near pSAC
24-Jun-96	Strangford Lough, Down	54.3922	-5.4203	20	near pSAC
21-Mar-02	Whitehead, Antrim (<i>near Black Head</i>)	54.7517	-5.6783	20	pSAC

Table 3: Analysis of high counts - Northern Ireland sites with 20 or more harbour porpoises recorded in one sighting, sorted by highest count.

Date	Location	Lat	Long	Animals
07-Oct-07	Light House Island, Copelands, Down	54.698	-5.525	100
11-Sep-09	Maiden Islands, Antrim	54.944	-5.717	70
29-Aug-03	Copeland Island, Down	54.6972	-5.4778	60
05-Sep-07	Light House Island, Copelands, Down	54.708	-5.524	60
11-Oct-11	Copeland Island, Down	54.685	-5.508	50
10-Oct-11	Copeland Island, Down	54.709	-5.492	50
13-Oct-01	Copeland Island, Down	54.73	-5.3917	50
17-Sep-06	Light House Island, Copelands, Down	54.7039	-5.515	45
06-Sep-07	Light House Island, Copelands, Down	54.703	-5.519	43
28-Sep-03	Copeland Island, Down	54.6833	-5.4778	40
09-Oct-11	Copeland Island, Down	54.707	-5.492	40
15-Sep-06	Light House Island, Copelands, Down	54.7031	-5.5019	35
23-Dec-06	Portmuck, Island Magee, Antrim	54.8575	-5.7186	35
04-Aug-01	Maiden Islands, Antrim	54.9333	-5.7189	35
28-Oct-06	Light House Island, Copelands, Down	54.7	-5.525	30
12-Oct-11	Copeland Island, Down	54.701	-5.503	30
06-Oct-11	Copeland Island, Down	54.7065	-5.502	30
17-May-11	Copeland Island, Down	54.707	-5.49	30
06-Jul-03	Black Head, Antrim	54.7667	-5.6625	30
01-Sep-14	Portmuck, Island Magee, Antrim	54.851	-5.721	29
24-Nov-12	Portmuck, Island Magee, Antrim	54.856	-5.718	26
08-Oct-07	Light House Island, Copelands, Down	54.698	-5.53	25
11-Aug-11	Copeland Island, Down	54.72	-5.525	25
04-Feb-07	Black Head, Antrim	54.7521	-5.676	25
18-Dec-04	Black Head, Antrim	54.7667	-5.65	25
05-Oct-05	Portmuck, Island Magee, Antrim	54.8556	-5.7167	25
19-May-11	Portmuck, Island Magee, Antrim	54.856	-5.712	25
30-Jun-14	North Channel, Copelands	54.901	-5.489	25
10-Jul-11	Maiden Islands, Antrim	54.913	-5.729	25
13-Jul-04	Portrush, Antrim	55.2083	-6.65	25
21-Jun-03	Lough Foyle, Derry	55.2333	-6.8	25
24-Aug-07	Garron Point, Antrim	55.079	-5.9	24
12-Sep-11	Copeland Island, Down	54.693	-5.479	23
06-Dec-11	Portmuck, Island Magee, Antrim	54.853	-5.712	23
13-Aug-11	Portmuck, Island Magee, Antrim	54.855	-5.721	23
16-Oct-09	Copeland Island, Down	54.701	-5.517	22
08-Aug-08	Black Head, Antrim	54.77	-5.685	22
04-Jan-13	Portmuck, Island Magee, Antrim	54.845	-5.711	22
11-Apr-04	Portmuck, Island Magee, Antrim	54.855	-5.71	21
26-Sep-09	Bloody Bridge, Newcastle, Down	54.167	-5.847	20

Date	Location	Lat	Long	Animals
12-Jul-13	St. John's Point, Down	54.223	-5.648	20
24-Jun-96	Strangford Lough, Down	54.3922	-5.4203	20
17-Aug-11	Burr Point, Nr. Ballyhalbert, Ards Peninsula, Down	54.487	-5.39	20
04-Aug-01	Copeland Island, Down	54.6933	-5.5256	20
19-May-01	Copeland Island, Down	54.6939	-5.5228	20
30-Aug-03	Copeland Island, Down	54.6972	-5.4778	20
07-Oct-11	Copeland Island, Down	54.711	-5.501	20
04-Oct-11	Copeland Island, Down	54.711	-5.491	20
06-Jun-08	Copeland Island, Down	54.716	-5.471	20
21-Mar-02	Whitehead, Antrim (<i>near Black Head</i>)	54.7517	-5.6783	20
03-Feb-07	Black Head, Antrim	54.7618	-5.6799	20
12-Aug-03	Black Head, Antrim	54.7667	-5.6625	20
08-Nov-09	Black Head, Antrim	54.767	-5.682	20
24-Aug-13	Portmuck, Island Magee, Antrim	54.851	-5.718	20
17-Dec-06	Portmuck, Island Magee, Antrim	54.8547	-5.7197	20